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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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In re application of: PATWARDHAN, et al.

Application No.: 10/707,208

Filed: November 26, 2003

Title: INTEGRATED CIRCUIT DEVICE  
PACKAGE HAVING A SUPPORT  
COATING FOR IMPROVED RELIABILITY  
DURING TEMPERATURE CYCLING

Attorney Docket No.: NSC1P131X3

Examiner: Vikki H. Trinh

Group: 2814

Confirmation No.: 1207

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I hereby certify that this correspondence is being transmitted electronically through EFS-WEB to the Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450 on December 13, 2007.

Signed: /swx/  
Susan W. Xu

**COMMUNICATION**

Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22314

Dear Sir:

Applicants hereby request review of the final rejections in the above-identified application. Review is requested for the reasons stated in the accompanying five-page Pre-Appeal Brief Request For Review.

This Request is being filed with a Notice of Appeal.

No claim amendments are being filed with this Request.

Respectfully Submitted,  
BEYER WEAVER LLP

December 13, 2007

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## **PRE-APPEAL BRIEF REQUEST FOR REVIEW**

### **I. Prior Art Rejections**

Claims 8-13, 21, 25-27 and 32 all stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2002/0027257 to Kinsman, et al. (“Kinsman”) alone. No other prior art rejection is given. In particular, the Final Office Action states:

- “Kinsman discloses . . . a plurality of solder bumps 20/32 (fig. 1f) . . . and a single support coating 30 (fig. 1f) . . . [that] has been fully cured . . . prior to any reflow of any of said . . . solder bumps.”
- “Note that the solder bumps are at least spherical in portion 32,(fig. 1e and page 4, [0029])”
- “and that the bumps are formed from a single homogenous material (page 3, [0023]).” and
- “it would have been obvious . . . to modify the invention of Kinsman with specific ranges for the support coating’s height relative to the bumps.”

Applicants respectfully traverse each of these rationales behind the pending rejections.

To establish a *prima facie* case of obviousness, a given prior art reference must teach or suggest all claim limitations, there must be a reasonable expectation of success when making a proposed modification to the prior art, and there must be some apparent reason to modify a reference. Applicants respectfully submit that none of these three requirements are met by the obviousness rejections set forth in the Final Office Action.

Applicants first submit that items 20 and 32 do not combine to form a single solder bump. Nevertheless, in the most recent claim amendments, the limitation “substantially spherical” was added to define the solder bumps in independent claim 8, and the limitation “wherein each of said [] solder bumps is formed from a single homogenous material” was added to define the solder bumps in each of independent claims 8, 13 and 32. A combination of items 20 and 32 is not substantially spherical and is not formed from a single homogenous material. Furthermore, there is no reason to modify the invention of Kinsman to adjust the height of its encapsulant, such that this proposed modification is not obvious. Kinsman simply does not teach or suggest solder bumps formed from a single homogenous material

that meet all other limitations of the pending claims, particularly those concerning wetting angles and a support coating having a height from 20 to 70 percent of the pre-reflow height of the solder bumps. As such, Kinsman cannot possibly render the pending claims as obvious.

Kinsman Items 20 and 32 Do Not Combine To Form Singular “Solder Bumps”

The Final Office Action points to items 20 and 32 of Kinsman as combining to form singular solder bumps. However, Kinsman teaches that its items 20 and 32 are separate and distinct items made of different materials. While item 32 is referred to as an “external conductive element” or “solder ball,” item 20 is called an “intermediate conductive element,” such as a UBM. As explained in Kinsman, intermediate conductive elements 20 are formed and then covered by encapsulant material 30 before external conductive elements 32 are ever formed. Kinsman, at [0023] – [0029]. The only instance where Kinsman suggests that item 20 might comprise solder is also qualified by the statement that such a solder be “of a higher melting temperature than that of another solder to be employed in external conductive elements 32.” Further, Kinsman specifically teaches that its external conductive elements 32 are to be reflowed while its intermediate conductive elements 20 are not to be reflowed during a reflow process. “Temperatures [and times] used to accomplish the reflowing of the solder paste [for external conductive elements 32] . . . must [] be closely controlled to prevent melting or decomposition of . . . intermediate conductive elements 20.” Kinsman at [0029]. Thus, Kinsman contemplates that a reflow process of its chip scale package should result in a reflow of its external conductive elements 32, but *not* a reflow of its intermediate conductive elements 20. Since items 20 and 32 of Kinsman are created separately, are intended to perform different functions, and are intended to behave differently during an actual reflow operation, these elements do not operate in conjunction to form singular “solder bumps 20/32” as stated in the Final Office Action. Because the pending rejections require this awkward misreading of Kinsman, the pending rejections fail for at least this reason.

### Combination of Kinsman Items 20 and 32 Fails To Meet Other Material Limitations

As detailed above, Applicants strongly disagree with the ongoing misreading of Kinsman that its items 20 and 32 combine to form singular solder bumps, and note that this misreading must be made in order to meet other restrictive limitations of the pending claims that involve wetting angles and a support coating having a height from about 20 to 70 percent of the pre-reflow height of the solder bumps. Assuming *arguendo*, however, that items 20 and 32 of Kinsman do form singular solder bumps, then the most recent claim amendments still clearly overcome the pending rejections.

Assuming that items 20 and 32 combine to form solder bumps, as set forth in the Final Office Action, then these alleged “solder bumps” are neither *substantially spherical* nor formed from a *single homogenous material*, as presently claimed. A review of any relevant figure in Kinsman finds that the proposed combination of its items 20 and 32 is not *substantially spherical*. “At least spherical in portion,” as offered by the Final Office Action, is not the same as “substantially spherical,” as presently claimed. Given its teachings and the purposes of its items 20 and 32, nothing in Kinsman suggests that a combination of these items 20 and 32 would or should result in a substantially spherical combined item.

In addition, as noted above, items 20 and 32 of Kinsman are created separately, are intended to perform different functions, and are intended to behave differently during an actual reflow operation. As such, it is clear that any proposed combination of these items 20 and 32 could not possibly be formed from a *single homogenous material*.

Accordingly, any reading of Kinsman that requires its items 20 and 32 to result in singular solder bumps cannot possibly result in Kinsman having “substantially spherical solder bumps” or “solder bumps formed from a single homogenous material,” as presently claimed. Any such misreading of Kinsman cannot render the pending claims as obvious for at least the reasons that neither of these material claim elements would be present. The pending rejections thus fail for at least each of these separate reasons.

## No Rational Basis For Modifying Kinsman As Proposed

One concern of the present invention is to create a support layer for solder bumps within a chip package. Because Kinsman is not concerned with creating a support layer for its solder bumps, it is unreasonable to modify Kinsman in ways that do nothing to help achieve its objectives. In fact, Kinsman actually teaches away from various limitations of the pending claims, such that many of the proposed modifications are simply inappropriate. For example, the Final Office Action states, “it would have been obvious . . . to modify the invention of Kinsman with specific ranges for the support coating’s height relative to the bumps so as to result in the first wetting angles being at least 40-50 degrees . . .” However, Kinsman does not teach a “support layer,” but rather an “encapsulant.” This encapsulant is intended to cover the entire layer for item 20 and to cover none of the layer or bumps shown as item 32. As such, the height of the encapsulant 30 is dictated by the height of the layer for item 20. Further, this encapsulant layer has absolutely nothing to do with wetting angles of the solder bumps. To suggest that it would be obvious to modify the height of this encapsulant layer for reasons that have nothing to do with the teachings of Kinsman is simply wrong. There is no reason for anyone to modify the height of the encapsulant layer beyond that which is needed to encapsulate the layer of item 20.

Because the pending rejections require that Kinsman be modified in a manner that does not make sense with respect to the actual objectives and teachings of Kinsman, the pending rejections fail for at least this separate additional reason.

## **II. Objection to Specification**

The specification was first objected to in the Final Office Action of September 19, 2005. Applicants responded to this objection in detail in their Responses of November 21, 2005 and February 7, 2006. Nevertheless, there has been an ongoing objection to the specification in all four Office Actions since this time, with no further explanation or rebuttal

to these noted prior remarks. Applicants respectfully request that further explanation be provided, or that this ongoing objection to the specification be withdrawn.

In view of the foregoing, it is respectfully submitted that the final rejections of all pending claims should be withdrawn.

Respectfully Submitted,  
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December 13, 2007

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